Answers to All Exercises

CHAPTER 5 • CHAPTER 5 • CHAPTER 5 • CHAPTER

LESSON 5.1

1a. yes, because $47 + 3(-15.6) = 0.2$ and $8 + 0.5(-15.6) = 0.2$

1b. No, because $23 \neq 12 + (-4)$; the point satisfies only one of the equations.

1c. No, because $12.3 \neq 4.5 + 5(2)$; furthermore, the lines are parallel, so the system has no solution.

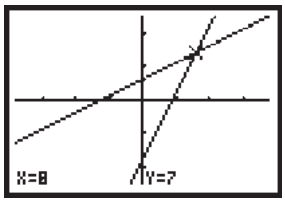
2a. table iv

2b. table iii

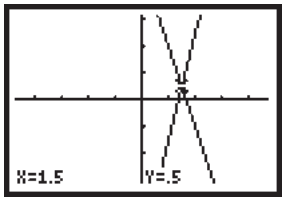
2c. table i

2d. table ii

3a. (8, 7)

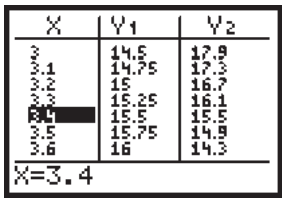


3b. (1.5, 0.5)

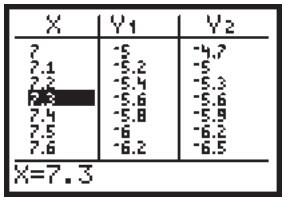


In this case, the calculator gives exact solutions that satisfy each system.

4a. (3.4, 15.5)



4b. (7.3, −5.6)



5a. $y = 3 - 2x$; $(1, 1)$: $4(1) + 2(1) = 6$

5b. $y = -4 + 0.4x$; $(1, -3.6)$: $2(1) - 5(-3.6) = 20$

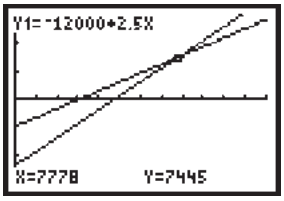
The point satisfies both forms of the linear equation.

6a. Let P represent profit in dollars and N represent the number of hits; $P = -12{,}000 + 2.5N$.

6b. P represents profit, N represents hits. Widget.kom's start-up costs are $5,000, and its advertisers pay $1.60 per hit. Because Widget.kom spent less in start-up costs, its website might be less attractive to advertisers, hence the lower rate.

6c. When $N \approx 7778$, $P \approx 7445$ in both equations.

6d. Graphing windows will vary. The one shown is [0, 12000, 1000, −15000, 15000, 6000].

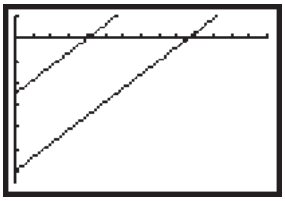


6e. Use the table to find (7778, 7445). Tracing on this graph is not precise.

6f. This intersection point indicates that for 7778 hits to their websites, the two companies make a profit of about $7,445.

7a. $P = -5000 + 2.5N$

7b.



[0, 7000, 500, −13000, 2000, 2000]

7c. Sally will always profit more than Gizmo.kom for the same number of website hits. Because their lines never intersect, there is no solution to the system of equations, and their profits will never be equal.

7d. 2000 hits; after 2000 hits, Sally will have earned back her start-up costs.

8a. $y = 25 + 30x$, where y is tuition for x credits at University College; $y = 15 + 32x$, where y is tuition for x credits at State College

8b. (5, 175); check: $175 = 25 + 30(5)$, $175 = 15 + 32(5)$

8c. Answers will vary. The table is more accurate than tracing on the calculator graph.

8d. When a student takes 5 credit hours, the tuition at either college is $175.

8e. It is cheaper to attend University if taking more than 5 credits; for fewer than 5 credits, it is cheaper to attend State. For 5 credits, they cost the same.

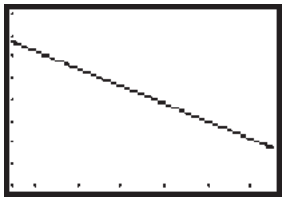
9a. $d = 9 - t$, where d is the drill team member's distance from the end zone; $d = 3 + 0.5t$, where d is the tuba player's distance from the end zone

9b. (4, 5); after 4 s, the tuba player bumps into the drill team member at the 5 yd mark.

10a. The equations give winning times of 28.239 min and 28.2398 min; the difference is 0.0008.

10b. The equations give winning times of 26.7594 min and 26.7602 min; the difference is 0.0008.

10c.



[1945, 2005, 10, 26, 30, 0.5]

10d. $\begin{cases} y = 109.2882 - 0.0411x \\ y = 109.289 - 0.0411x \end{cases}$

The graph in 10c appears to show one line; however, the y-values are 0.0008 unit apart. While the two lines are not identical, they are well within the accuracy of the model, so you could say they are the same model.

11a. Because lines with different slopes always intersect, the y-intercept a can equal any number, and b can be any number except -5.

11b. $a \neq 2$ and $b = -5$; same slope, different y-intercept, lines do not intersect

11c. $a = 2$ and $b = -5$; same slope and y-intercept, lines overlap

12a. *Spirit of the Tri-Cities:* 5.172 min; *Miss B:* 4.597 min

12b. *Spirit of the Tri-Cities:* 22.241 gal; *Miss B:* 19.766 gal

12c. *Spirit of the Tri-Cities:* 24.167 mi; *Miss B:* 27.194 mi

12d. *Spirit of the Tri-Cities:* 0.562 mpg; *Miss B:* 0.632 mpg

13a. $x = 85$

13b. $x = -8.2$

13c. $x = 3$

13d. $x = 3.5$

13e. $x = 1.5$

14.

$2x + 9 = 6x + 1$	Original equation.
$2x - 2x + 9 = 6x - 2x + 1$	Subtract $2x$ from both sides.
$9 = 4x + 1$	Combine like terms.
$9 - 1 = 4x + 1 - 1$	Subtract 1 from both sides.
$8 = 4x$	Combine like terms.
$\frac{8}{4} = \frac{4x}{4}$	Divide both sides by 4.
$x = 2$	Reduce.

15a. $\begin{bmatrix} 1 & -11 \\ -6 & 8 \end{bmatrix}$

15b. $\begin{bmatrix} 13 & -1 \\ 7 & 8 \end{bmatrix}$

16a. $y = 5x - 2$

16b. $y = 0.8 - 1.4x$

16c. $y = 1.5 + 3x$

LESSON 5.2

1. See below.

2a. no, because the point satisfies only the first equation

2b. yes, because $19.25 = 32 - 3(4.25)$ and $19.25 = 15 + 4.25$

2c. No, because the point satisfies only the second equation; furthermore, the lines have the same slope, so they are parallel and there is no solution.

3a.
$$\begin{aligned} 2x + 3x &= 4 - 14 \\ 5x &= -10 \\ x &= -2 \end{aligned}$$

3b.
$$\begin{aligned} -2y + y &= -3 - 7 \\ -y &= -10 \\ y &= 10 \end{aligned}$$

3c.
$$\begin{aligned} 5d - 2d &= 9 \\ 3d &= 9 \\ d &= 3 \end{aligned}$$

3d.
$$\begin{aligned} t - 4t &= -12 \\ -3t &= -12 \\ t &= 4 \end{aligned}$$

4. $(5, 175)$; check: $175 = 25 + 30(5)$ and $175 = 15 + 32(5)$

5a. $5x + 2(4 - 3x) = 5x + 8 - 6x = -x + 8$

5b. $7x - 2(4 - 3x) = 7x - 8 + 6x = 13x - 8$

6a. $(1, 1)$; check: $1 = 4 - 3(1)$ and $1 = 2(1) - 1$

6b. $\left(\frac{7}{4}, -\frac{1}{4}\right)$ or $(1.75, -0.25)$; check: $2(1.75) - 2(-0.25) = 4$ and $1.75 + 3(-0.25) = 1$

7a. See below.

7b. The approximate solution, $N \approx 7778$ and $P \approx 7444$, is more meaningful because there cannot be a fractional number of website hits.

8a. The total admission price for two adults and three students is \$13.50.

8b. $x = 4.5$ and $y = 1.5$

8c. An adult ticket costs \$4.50, and a student ticket costs \$1.50.

9a. $A + C = 200$

9b. $8A + 4C = 1304$

9c. $A = 126$ and $C = 74$, so the theater sold 126 adult tickets and 74 child tickets.

10a. The first walker starts at the 0.5 m mark and walks away at 0.75 m/s. The second walker starts at the 2.5 m mark and walks away at 0.75 m/s.

10b. no solution

10c. The walkers will never meet.

11a. $\begin{cases} d = 35 + 0.8t \\ d = 1.1t \end{cases}$

$1.1t = 35 + 0.8t; \left(116\frac{2}{3}, 128\frac{1}{3}\right)$

The pickup passes the sports car roughly 128 mi from Flint after approximately 117 min.

11b. $\begin{cases} d = 220 - 1.2t \\ d = 1.1t \end{cases}$

$220 - 1.2t = 1.1t, \left(\frac{2200}{23}, \frac{2420}{23}\right) \approx (95.7, 105.2)$

The minivan meets the pickup truck about 105 mi from Flint after approximately 96 min.

11c. $\begin{cases} d = 220 - 1.2t \\ d = 35 + 0.8t \end{cases}$

$35 + 0.8t = 220 - 1.2t$; $(92.5, 109)$

The minivan meets the sports car 109 mi from Flint after 92.5 min.

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1. (*Lesson 5.2*)

$d = 12 - 2.5t$	1. Original equation.
$1.5t = 12 - 2.5t$	2. Substitute $1.5t$ for d.
$1.5t + 2.5t = 12 - 2.5t + 2.5t$	3. Add $2.5t$ to both sides.
$4t = 12$	4. Combine like terms.
$\frac{4t}{4} = \frac{12}{4}$	5. Divide both sides by 4.
$t = 3$	6. Reduce.

7a. (*Lesson 5.2*)

Answers will vary. A sample solution:

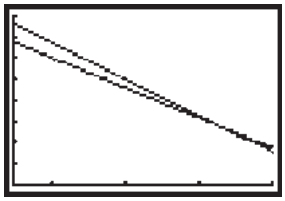
$-12{,}000 + 2.5N = -5{,}000 + 1.6N$	Set equations equal to each other.
$-12{,}000 + 0.9N = -5{,}000$	Subtract $1.6N$ from both sides.
$0.9N = 7{,}000$	Add 12,000 to both sides.
$N = \frac{70{,}000}{9} = 7{,}777\frac{7}{9}$	Divide both sides by 0.9.
$P = -12{,}000 + 2.5\left(\frac{70{,}000}{9}\right) = 7{,}444\frac{4}{9}$	

11d. $220 - 1.2t = 2(35 + 0.8t)$, $t \approx 53.6$ min; minivan is about 156 mi, sports car is about 78 mi.

12a. women: $y = 71.16 - 0.1715(x - 1976)$ or $y = 67.73 - 0.1715(x - 1996)$; men: $y = 63.44 - 0.142\ (x - 1976)$ or $y = 60.60 - 0.142(x - 1996)$

12b. $x \approx 2238$, $y \approx 26.23$

12c. Answers will vary. The window shown is [1950, 2300, 100, 0, 80, 10].



12d. The solution means that in the year 2238 (a little more than 230 years from now), both men and women will swim this race in 26.23 s. This is not likely. The model may be a good fit for the data, but extrapolating that far into the future produces unlikely predictions.

13. 5 lb of sour cherry worms and 15 lb of sour lime bugs

14. $4\frac{2}{3}$L of bottled fruit juice and $5\frac{1}{3}$ L of natural orange soda

15a. $y = -4.5$

15b. $x = 3$

16a. 12.1 ft/s

16b. 50 s

16c. $y = 100 + 12.1x$, where x represents the time in seconds and y represents her height above ground level. To find out how long her ride to the observation deck is, solve the equation $520 = 100 + 12.1x$.

17a. $2\frac{1}{6}$

17b. $\frac{2}{3}$

17c. $\frac{1}{6}$

17d. $\frac{97}{60}$, or $1\frac{37}{60}$

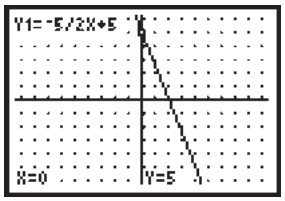
18a. i

18b. iii

18c. ii

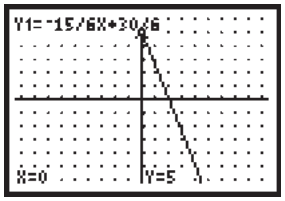
LESSON 5.3

1a. $y = \frac{10 - 5x}{2}$, or $y = 5 - \frac{5x}{2}$



$[-9.4, 9.4, 1, -6.2, 6.2, 1]$

1b. $y = \frac{30 - 15x}{6}$, or $y = 5 - \frac{5x}{2}$



The graph is the same as the graph for 1a. Both equations are equivalent to $y = 5 - \frac{5}{2}x$.

2a. $(6, 10)$

2b. $(-4, -15)$

2c. $(12, 25)$

2d. $(0, -5)$

3a. You can simply add the equations as they are to eliminate the x-terms: $-5y = 5, y = -1$; $6x = -15, x = -2.5$. The solution is $(-2.5, -1)$.

3b. You can multiply the first equation by 2 to eliminate the y-terms: $17x = 51, x = 3$; $8y = -16, y = -2$. The solution is $(3, -2)$.

4a. substitution

4b. The y-value is missing from her solution.

4c. $y = -1$; $(4, -1)$

5a. Multiply the first equation by -5 and the second equation by 3, or multiply the first equation by 5 and the second equation by -3.

5b. Multiply the first equation by -8 and the second equation by 7, or multiply the first equation by 8 and the second equation by -7.

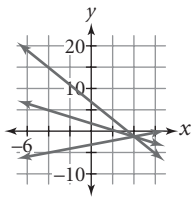
6. The solution is $(2, -2)$. You can (1) solve for y and graph, then look for the point where the lines intersect; (2) solve for y, create tables, and zoom in to where the y-values are equal; (3) solve one equation for y (or x) and substitute into the other; or (4) multiply the equations and add them to eliminate x or y.

7a. $(4, 2)$

7b. $(3, -1)$

7c. $(-3, -1)$

8.



8a. $y = -3 + 0.5x$

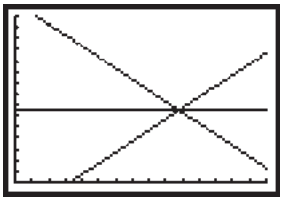
8b. $y = 2 - 0.75x$

8c. $y = 7 - 2x$

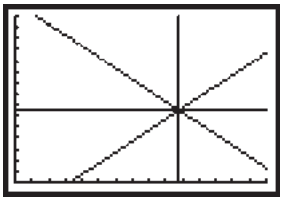
8d. The solution of the system is also a solution of the sum of the equations.

9a. $y = 163 - x$ and $y = -33 + x$

9b. $2y = 130, y = 65$



9c. $2x = 196, x = 98$



9d. The four lines intersect at the same point, $(98, 65)$; the solution to the system must satisfy all the equations—the original equations in the system and any new equations created by combining pairs of equations.

10. Answers will vary. Substitute $(5, 2)$ for x and y in $4x + ay = b$ to get $20 + 2a = b$. One possibility is $4x - 3y = 14$.

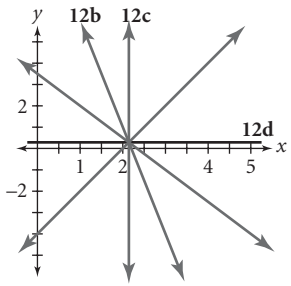
11a. Multiply the first equation by -3; $-6x + 15y = -36$.

11b. $0 = 0$

11c. There are infinitely many solutions.

11d. One equation is a multiple of the other.

12a. $y = 3.5 - 1.5x$ and $y = -4 + 2x$



12b. $y = 11 - 5x$; this line passes through the point where the two original equations intersect.

12c. $x = \frac{15}{7}$; this line passes through the point where the two original equations intersect.

12d. $y = \frac{2}{7}$; this line passes through the point where the two original equations intersect.

12e. $\left(\frac{15}{7}, \frac{2}{7}\right)$; this is the intersection point of all the lines in 12a–d.

12f. Answers will vary. If two equations intersect in a point, any combination of multiples of the two equations intersects in the same point. That's why the elimination method works.

13a. $\begin{cases} w + p = 10 \\ 3.25w + 10.50p = 61.50 \end{cases}$

13b. They bought six wallet-size pictures and four portrait-size.

14a. Let c represent gallons burned in the city and h represent gallons burned on the highway.

$\begin{cases} c + h = 11 \\ 17c + 25h = 220 \end{cases}$

14b. (6.875, 4.125); 6.875 gal in the city, 4.125 gal on the highway

14c. $\frac{17 \text{ mi}}{\text{gal}} \cdot 6.875 \text{ gal} \approx 117 \text{ city mi}, \frac{25 \text{ mi}}{\text{gal}} \cdot 4.125 \text{ gal} \approx 103 \text{ hwy mi}$

14d. check: $\begin{cases} 6.875 + 4.125 = 11 \\ 17(6.875) + 25(4.125) = 220 \end{cases}$ and $117 + 103 = 220$

15a. $\frac{5}{8}$

15b. $\frac{3}{4}$

15c. $-\frac{9}{40}$

15d. $\frac{2}{3}$

15e. Sample answer: Find a common denominator, select a new numerator between the other two, and reduce.

16a. **Marsha's Climb**

	Elevation (ft)	Temperature (°F)
Start	4,300	78
Rest station	7,800	64
Highest point	11,900	47.6

16b. $T = 95.2 - 0.004E$; the slope is the rate of change in temperature for each increase of 1 ft in elevation, and the y-intercept (in this case, T-intercept) is the temperature that day at sea level in the same area.

16c. At the summit the temperature was 13.9°F.

17a. $y = -3 - 2(x - 5)$

17b. $y = 7 + 2.5(x + 3)$

18a. Walker A: $y = 0.5 + x$; Walker B: $y = 10.5$ when $x \leq 1$ and $y = 10.5 - 0.5(x - 1)$, or $y = 11 - 0.5x$, when $x > 1$

18b. They meet 7.5 ft from the sensor, when 7 s have passed.

18c. Walker B is farther from the sensor than Walker A for all times up to, but not including, 7 s.

LESSON 5.4

1a. $\begin{cases} 2x + 1.5y = 12.75 \\ -3x + 4y = 9 \end{cases}$

1b. $\begin{cases} \frac{1}{2}x = \frac{1}{2} \\ -x + 2y = 0 \end{cases}$

1c. $\begin{cases} 2x + 3y = 1 \\ 2y = 0 \end{cases}$

2a. $\begin{bmatrix} 1 & 4 & 3 \\ -1 & 2 & 9 \end{bmatrix}$

2b. $\begin{bmatrix} 7 & -1 & 3 \\ 0.1 & -2.1 & 3 \end{bmatrix}$

2c. $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 1 & 6 \end{bmatrix}$

3a. $(8.5, 2.8)$

3b. $\left(\frac{1}{2}, \frac{13}{16}\right)$

3c. $(0, 0)$

4. Divide row 1 by 4.2:

$\begin{bmatrix} 1 & 0 & 3 \\ 0 & -1 & 5.25 \end{bmatrix}$.

Multiply row 2 by -1:

$\begin{bmatrix} 1 & 0 & 3 \\ 0 & 1 & -5.25 \end{bmatrix}$.

Solution: $(3, -5.25)$.

5a. $\begin{cases} 3x + y = 7 \\ 2x + y = 21 \end{cases}$

5b. $\begin{bmatrix} 3 & 1 & 7 \\ 2 & 1 & 21 \end{bmatrix}$

6. See below.

7a.

	Adults	Children	Total (kg)
Monday	40	15	10.8
Tuesday	35	22	12.29

7b. Let x represent the average weight of chips an adult eats and y represent the average weight of chips a child eats. The system is

$\begin{cases} 40x + 15y = 10.8 \\ 35x + 22y = 12.29 \end{cases}$.

7c. $\begin{bmatrix} 40 & 15 & 10.8 \\ 35 & 22 & 12.29 \end{bmatrix}$

7d. Add -35 times row 1 to 40 times row 2 and put the result in row 2: $\begin{bmatrix} 40 & 15 & 10.8 \\ 0 & 355 & 113.6 \end{bmatrix}$.

Divide row 2 by 355: $\begin{bmatrix} 40 & 15 & 10.8 \\ 0 & 1 & 0.32 \end{bmatrix}$.

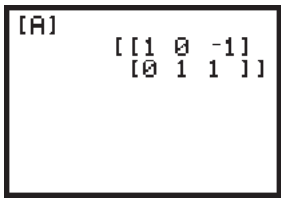
Add -15 times row 2 to row 1:

$\begin{bmatrix} 40 & 0 & 6 \\ 0 & 1 & 0.32 \end{bmatrix}$.

Divide row 1 by 40: $\begin{bmatrix} 1 & 0 & 0.15 \\ 0 & 1 & 0.32 \end{bmatrix}$.

7e. Each adult ate an average of about 0.15 kg (150 g) of chips, and each child ate an average of 0.32 kg (320 g) of chips.

8.



9a. Let x represent the number of small trucks and y represent the number of large trucks. The system is $\begin{cases} 5x + 12y = 532 \\ 7x + 4y = 284 \end{cases}$.

9b. $\begin{bmatrix} 5 & 12 & 532 \\ 7 & 4 & 284 \end{bmatrix}$

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6. (*Lesson 5.4*)

Description	Matrix	System equations
The matrix for $\begin{cases} 3x + 2y = 28.9 \\ 8x + 5y = 74.6 \end{cases}$	$\begin{bmatrix} 3 & 2 & 28.9 \\ 8 & 5 & 74.6 \end{bmatrix}$	$3x + 2y = 28.9$ $8x + 5y = 74.6$
Add 8 times row 1 to -3 times row 2 and put the result in row 2.	$\begin{bmatrix} 3 & 2 & 28.9 \\ 0 & 1 & 7.4 \end{bmatrix}$	$3x + 2y = 28.9$ $y = 7.4$
Add -2 times row 2 to row 1 and put the result in row 1.	$\begin{bmatrix} 3 & 0 & 14.1 \\ 0 & 1 & 7.4 \end{bmatrix}$	$3x = 14.1$ $y = 7.4$
Divide row 1 by 3. The solution is $(4.7, 7.4)$.	$\begin{bmatrix} 1 & 0 & 4.7 \\ 0 & 1 & 7.4 \end{bmatrix}$	$x = 4.7$ $y = 7.4$

9c. Solution steps will vary; $\begin{bmatrix} 5 & 12 & 532 \\ 7 & 4 & 284 \end{bmatrix} \rightarrow \begin{bmatrix} -16 & 0 & -320 \\ 0 & -64 & -2304 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 20 \\ 0 & 1 & 36 \end{bmatrix}$.

9d. Zoe should order 20 small trucks and 36 large trucks.

10a. x represents the number of grams of Flour X used in each loaf, and y represents the number of grams of Flour Y used in each loaf. The first equation sums the amount of each type of flour to get the total amount of flour in the loaf, and the second equation sums the amount of calcium contributed by each type of flour to get the total amount of calcium.

10b. $\begin{bmatrix} 1 & 1 & 300 \\ 0.12 & 0.04 & 30 \end{bmatrix}$

10c. $\begin{bmatrix} 1 & 0 & 225 \\ 0 & 1 & 75 \end{bmatrix}$

10d. Will should mix 225 g of Flour X with 75 g of Flour Y.

11a. $\begin{cases} m + t + w = 286 \\ m - t \quad\quad = 7 \\ \quad\quad t - w = 24 \end{cases}$

11b. $\begin{bmatrix} 1 & 1 & 1 & 286 \\ 1 & -1 & 0 & 7 \\ 0 & 1 & -1 & 24 \end{bmatrix}$

The rows represent each equation. The columns represent the coefficients of each variable and the constants.

11c. The sequence of row operations will vary; the solution matrix is

$\begin{bmatrix} 1 & 0 & 0 & 108 \\ 0 & 1 & 0 & 101 \\ 0 & 0 & 1 & 77 \end{bmatrix}$.

11d. They cycled 108 km on Monday, 101 km on Tuesday, and 77 km on Wednesday.

12a. $\begin{bmatrix} 72 & 65 \\ 55 & 55 \\ 45 & 35 \end{bmatrix} - \begin{bmatrix} 31 & 28 \\ 26 & 24 \\ 21 & 16 \end{bmatrix} = \begin{bmatrix} 41 & 37 \\ 29 & 31 \\ 24 & 19 \end{bmatrix}$

12b. If you are planning to be in the park for 3 days, then the 3-day ticket is a much better deal. If you bought three 1-day tickets, the cost would be $\begin{bmatrix} 93 & 84 \\ 78 & 72 \\ 21 & 48 \end{bmatrix}$.

12c. If you are going to be in the park for 2 days, the cost of two 1-day tickets would be $\begin{bmatrix} 62 & 56 \\ 52 & 48 \\ 42 & 32 \end{bmatrix}$. This is less than the cost of the 3-day ticket, so if you are going for only 2 days, you should buy two 1-day tickets.

13a. 4, Ans − 0.5

13b. −3, Ans + 2

13c. 1/2, Ans − 1

13d. 0, Ans + 1

14a. Slope: 0.75; the slope is the cost per drink once you've bought the mug.

14b. $y = 49.75 + 0.75(x - 33)$

14c. $y = 25 + 0.75x$; the y-intercept is the cost of buying the mug.

15. $\begin{bmatrix} 1 & 3 \\ -2 & 1 \\ 3 & 23 \end{bmatrix} \rightarrow \begin{matrix} 3 & -3 & 0 \\ -6 & -1 & -7 \\ 9 & -23 & -14 \end{matrix}$

$-7y = -14, y = 2; x = 7$

LESSON 5.5

1a. Multiply by 4; $12 < 28$.

1b. Multiply by -3; $-15 \geq -36$.

1c. Add -10; $-14 \geq x - 10$.

1d. Subtract 8; $b - 5 > 7$.

1e. Divide by 3; $8d < 10\frac{2}{3}$.

1f. Divide by -3; $-8x \geq -10\frac{2}{3}$.

2a. Answers will vary, but the values must be > 8.

2b. Values must be > -7.

2c. Values must be < 7.92.

2d. Values must be $< \frac{120}{13}$ or $9\frac{3}{13}$ (≈ 9.2308).

3a. $x \leq -1$

3b. $x > 0$

3c. $x \geq -2$

3d. $-2 < x < 1$

3e. $0 < x \leq 2$

4a. $3 > x$

4b. $y \geq -2$

4c. $z \leq 12$

4d. $n \leq 7$

5a. $y = \frac{5.2 - 3x}{4} = 1.3 - 0.75x$

5b. $y = \frac{2x}{3} + 5$, or $\frac{2x + 15}{3}$

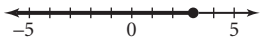
6a. $x > 4.34375$, or $\frac{139}{32}$

6b. $b > 1.\overline{3}$

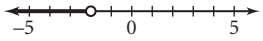
6c. $x \leq -6$

6d. $x \leq -5.6$

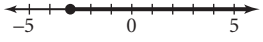
7a. $x \leq 3$



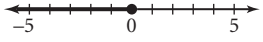
7b. $x < -2$



7c. $x \geq -3$



7d. $x \leq 0$



8. $50 + 7.5w > 120$; $w > 9.\overline{3}$; Ezra has been saving for at least 10 wk.

9a. Add 3 to both sides; $4 < 5$.

9b. Divide both sides by 2 (or multiply by 0.5); $3 > 1$.

9c. Multiply both sides by -3; $3 > -3$.

9d. Multiply both sides by 2; $0 < 6$.

10a. $-9 < 9$ is true.

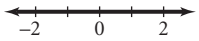
10b. $21 \geq 51$ is false.

10c. $7 < 7$ is false.

10d. $24 \geq 18$ is true.

11a. The variable x drops out of the inequality, leaving $-3 > 3$, which is never true. So the original inequality is not true for any number x. The graph would be an empty number line, with no points filled in.

11b. The variable x drops out of the inequality, leaving $-6.6 \geq -15$, which is always true. So the original inequality is true for any number x. The graph would be a line with arrows on both ends.



12. $2.834 - 0.002 \leq x \leq 2.834 + 0.002$; $2.832 \leq x \leq 2.836$ m

13a. $d \leq 30$ (d for dollars spent on CDs)

13b. $h \geq 48$ (h for height of riders)

13c. $p \geq 3$ (p for people in carpool)

13d. $a \geq 17$ (a for age of person admitted)

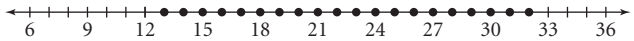
14a. When is the sports car 131 or more miles away from Flint?

14b. $x \geq 120$

14c. When is the minivan closer than the sports car to Flint?

14d. $x > 92.5$

15. $12 < x \leq 32$



16a. Multiply 12 by 3.2 to get 38.4. Subtract 38.4 from 72 to get 33.6.

16b. Square 5 to get 25. Subtract 25 from 3 to get -22. Multiply -22 by 1.5 to get -33. Add -33 to 2 to get -31.

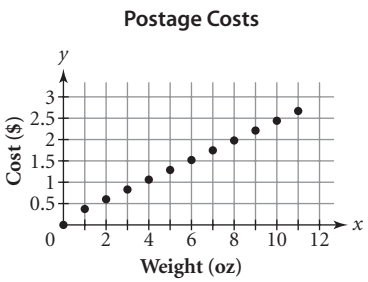
16c. Divide 21 by 7 to get 3 and divide 6 by 2 to get 3. Subtract 3 from 3 to get 0.

17a. 0.37 ENTER

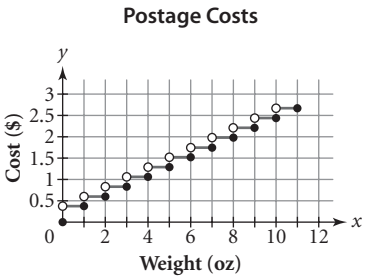
Ans + 0.23 ENTER, ENTER, ...

Weight (oz)	Rate ($)
1	0.37
2	0.60
3	0.83
4	1.06
5	1.29
6	1.52
7	1.75
8	1.98
9	2.21
10	2.44
11	2.67

17b.



17c. A line would mean that the cost would pass through each amount between the different increments. For example, if a package weighed 0.5 oz, you would pay \$0.185. However, the cost increases discretely. To show this, draw segments for each integral ounce. Note the open and closed circles.



17d. \$2.67

18a. $-2x - 16$

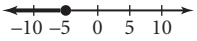
18b. $3 - 4y$

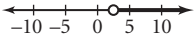
18c. $-z + 5$

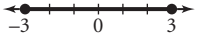
LESSON 5.6

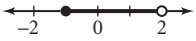
1a. iii **1b.** ii **1c.** i **1d.** iv

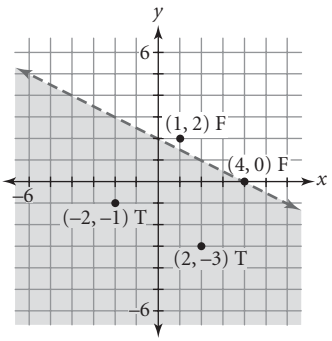
2a. $y \geq -12x + 10$ **2b.** $y > 40x - 60$

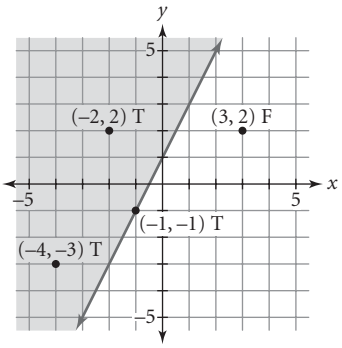
3a.


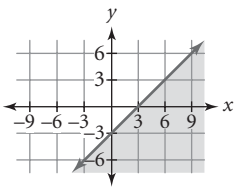
3b.


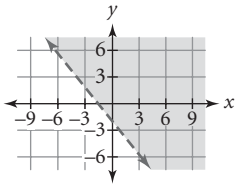
3c.


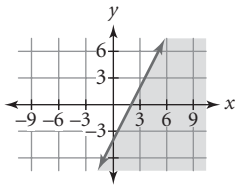
3d.


4a–c.


5a–c.


6a.


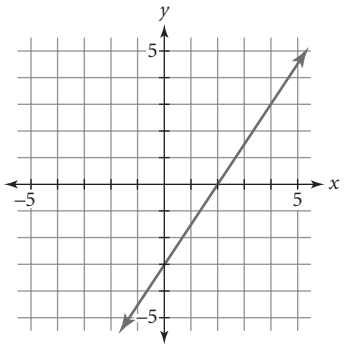
6b.


6c.


7a. $y \leq 1 - 2x$ **7b.** $y < -2 + \frac{2}{3}x$

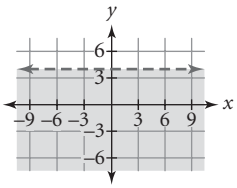
7c. $y > 1 - 0.5x$ **7d.** $y \geq -2 + \frac{1}{3}x$

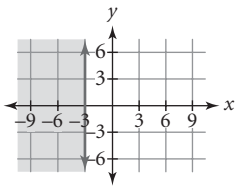
7e. $y \leq 2$ **7f.** $x < 2$

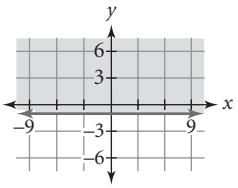
8a. $y = -3 + 1.5x$


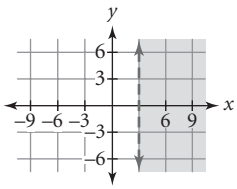
8b. (1, 3); above

8c. If the coefficient of y is negative, then shade the side opposite what the inequality symbol indicates.

9a.


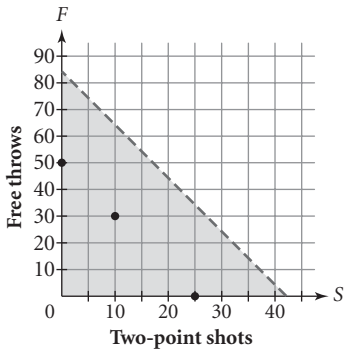
9b.


9c.


9d.


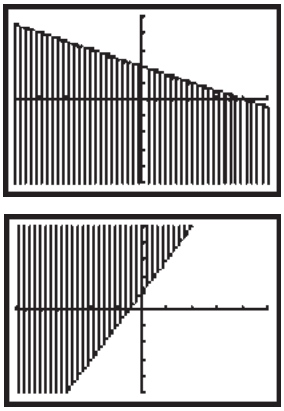
10a. $F + 2S < 84$

10b. $F + 2S = 84$

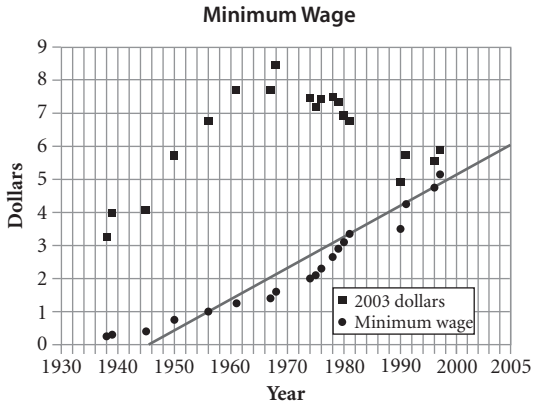
10c.


10d. possible answer: (0, 50), (10, 30), (25, 0)

11.



12a, d.



12b. minimum wage

12c. Q-points: (1956, 1.00), (1981, 3.35); $y = -182.864 + 0.094x$

12e. The minimum wage increases 9¢ every year on average, but the actual dollar value was highest in 1968 and has decreased almost every year since then.

13a. about 27 mi/h

13b. Because $d = r \cdot t$ and the distance was the same for both Ellie and her grandmother, you can set these products equal to each other. If you let r represent Ellie's grandmother's speed, then $2.5(65) = 6r$.

14a. $y = \frac{7}{3}x - \frac{22}{3}$

14b. $y = -\frac{5}{4}x - 3$

LESSON 5.7

1a. iii **1b.** i **1c.** ii

2a. Yes; (1, 2) satisfies both inequalities.

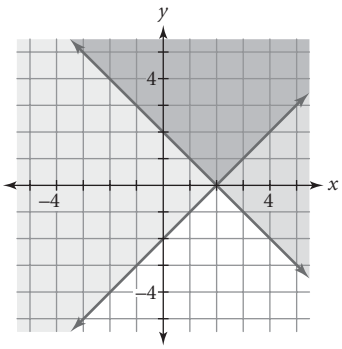
2b. No; only one inequality is satisfied.

2c. No; for both inequalities, $\frac{4}{3} > \frac{4}{3}$ is not true.

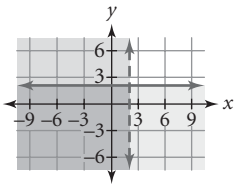
2d. No; neither inequality is satisfied.

3a. $y \geq -x + 2; y \geq x - 2$

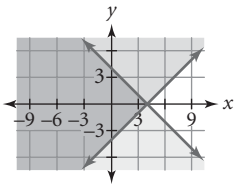
3b.



4a.



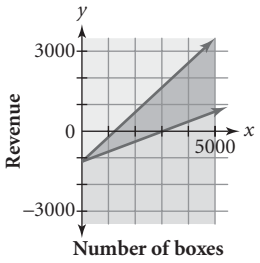
4b.



5. $\begin{cases} y > 2 - x \\ y < 2 \\ x < 3 \end{cases}$

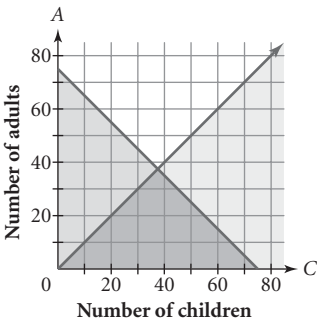
6a. $y \geq -1250 + 0.40x, y \leq -1250 + 1.00x, x \geq 0$

6b.



7a. $\begin{cases} A \leq C \\ A + C \leq 75 \\ A \geq 0 \\ C \geq 0 \end{cases}$

7b.



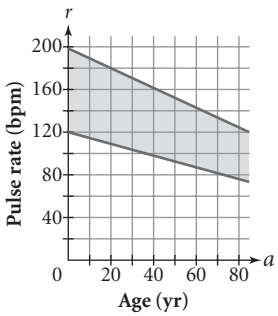
All the points in the dark-shaded triangular region satisfy the two inequalities. The point (50, 10) represents the situation in which 50 children escort 10 adults.

7c. Answers will vary. It is possible to have all children and no adults at the restaurant. One possible additional constraint is that there must be at least one adult per five children, or $A \geq \frac{1}{5}C$. The solution for this set of constraints is the triangular region bounded by $A \leq C, A + C \leq 75$, and $A \geq 0.2C$.

8a. $r = 220 - a$, where a represents age in years and r represents the heart rate in beats per minute

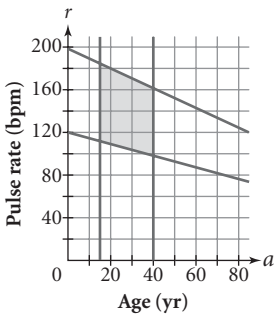
8b. $\begin{cases} r \leq 0.90(220 - a) \\ r \geq 0.55(220 - a) \end{cases}$ or $\begin{cases} r \leq 198 - 0.90a \\ r \geq 121 - 0.55a \end{cases}$

8c.



8d. $a \geq 14$ and $a \leq 40$

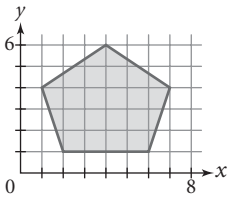
8e.



9. $x \geq 3$ and $y \geq -2 + \frac{1}{2}x$

10. $AB: y \leq \frac{2}{3}x + \frac{5}{3}; BC: y \leq -\frac{3}{5}x + \frac{59}{5}$; $AC: y \geq \frac{1}{11}x + \frac{31}{11}$

11. The region is a pentagon.



12. Region 1: $\begin{cases} y \geq 3 \\ y \geq x - 2 \\ y \leq \frac{1}{3}x + \frac{8}{3} \end{cases}$ Region 2: $\begin{cases} y \leq 3 \\ y \leq x - 2 \\ y \geq \frac{1}{3}x \end{cases}$

13a. \$713.15 **13b.** \$957.80

14a. 4 **14b.** 10

14c. $\frac{10\left(\frac{3x + 12}{5} - 1.4\right) - 10}{6}$, which simplifies to x

15a. $x = 6, y = 21$ **15b.** $x = -2, y = -1$

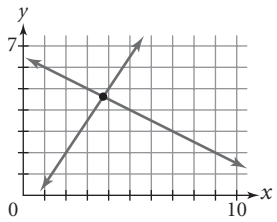
16. 19% acid

CHAPTER 5 REVIEW

1. line *a*: $y = 1 - x$; line *b*: $y = 3 + \frac{5}{2}x$; intersection: $\left(-\frac{4}{7}, \frac{11}{7}\right)$

2. The lines meet at the point (4, 1); the equations $3(4) - 2(1) = 10$ and $(4) + 2(1) = 6$ are both true.

3.



The point of intersection is (3.75, 4.625).

4. See below.

5a. . . . the slopes are the same but the intercepts are different (the lines are parallel).

5b. . . . the slopes are the same and the intercepts are the same (the lines coincide).

5c. . . . the slopes are different (the lines intersect in a single point).

6a. $x > -1$

6b. $x < 2$

6c. $-2 \leq x < 1$

7. $x \leq -1$

8. $\begin{cases} y \leq x + 4 \\ y \leq -1.25x + 8.5 \\ y \geq 1 \end{cases}$

9a. 10 m^2/min; 7 m^2/min

9b. No; he will cut 156 m^2, and the lawn measures 396 m^2.

9c. $10h + 7l = 396$

9d. $\frac{1}{30}$ L/min; $\frac{3}{200}$ L/min

9e. $\frac{h}{30} + \frac{3l}{200} = 1.2$

9f. $l = 14.4$ min, $h = 29.52$ min; if Harold cuts for 29.52 min at the higher speed and 14.4 min at the lower speed, he will finish Mr. Fleming's lawn and use one full tank of gas.

10. $\begin{bmatrix} 1 & 0 & -3 \\ 0 & 1 & -8 \end{bmatrix}$

---

4. (*Chapter 5 Review*)

$$\begin{aligned}
16 + 4.3(x - 5) &= -7 + 4.2x && \text{Set the right sides of the two equations equal to each other.} \\
16 + 4.3x - 21.5 &= -7 + 4.2x && \text{Apply the distributive property.} \\
-5.5 + 4.3x &= -7 + 4.2x && \text{Subtract.} \\
0.1x &= -1.5 && \text{Add } -4.2x \text{ and } 5.5 \text{ to both sides.} \\
x &= -15 && \text{Divide both sides by 0.1.} \\
y &= -7 + 4.2(-15) && \text{Substitute } -15 \text{ for } x \text{ to find } y. \\
y &= -70 && \text{Multiply and add.}
\end{aligned}$$

The solution is $x = -15$ and $y = -70$.